KENWOOD

TS-440 SAT Modifications

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TS 440 Serial Communications Interface.

These Instructions are TS-440 specific, but the basics also apply to the TS-940, TS-811 and TS-711.

It is possible to save yourself a few dollars and lose nothing in quality by buying the parts to upgrade your Kenwood radio for computer control. Just purchase the parts were you find them and install them using the instructions in the Radio's Manual.

IC 54 is a uPD-8251-AC Serial Communications Interface.
Commonly called an 8251A ($1.89 Mail Order)
IC 55 is a TC-4040-BP 12 Stage CMOS Divider.
Commonly called a 4040 ($0.69 Mail Order)

The IC-10 Interface Kit from Kenwood Contains ONLY these two parts and less instructions than are in this file. The only thing you are going to miss, is the $22+ price tag on the IC-10 Kit.

Signals are TTL levels (NOT RS-232)
Baud rate is 4800 (1200 Opt.)
Format is ASCII Serial; 1 Start, 8 Data, 2 Stops
The Baud rate may be changed to 1200 Baud by removing jumper W50 and installing a jumper from the left pad to the center pad as viewed from the front of the radio. This will become obvious once you have the radio opened up. Many other Baud rates are possible, just look at the schematic.

As long as you are in the radio, lift D-60 to enable the 10 Hz.
display. The main tuning knob is varing this digit, so you might as well see it. It also helps when using RIT/XIT as the RIT/XIT display does not resolve the 0.01 KHz. digit. This Modification is in the Radio's Book.

Not in the book is the fact that if you lift D-80 and do an MPU reset, you will be able to transmit on any frequency between 1.5 and 30.0 MHz. This means you will be able to work the Mars nets, Etc. Do not transmit out of band. It is illegal even if it is accidental.

Some computers use TTL levels on their serial ports. If so, here is a time when you will not have to convert it to RS-232.

The IF-232 Interface from Kenwood is a 1488 and a 1489 chip in a box. These are an RS-232 Quad Line Driver and Receiver and are available at Radio Shack for $1.29 Each. Here is an easy project that will save you a lot over the $69+ Kenwood price of the IF-232 Interface. The 1488 needs a + and - supply.

Unregulated + and - 12vdc is just fine. Get the +5 vdc for the 1489 by putting a 7805 regulator on the +12 vdc supply.
100 ma. is about the max you'll draw, so the smallest transformer you can find will still be plenty large. Don't forget to series up two of each gate to cancel the inversion that the 1480's produce.

ACC-1 Connector Use a 6 Pin DIN Connector.
(Radio Shack $1.29)

Pin Signal Comments
_____

1 Gnd Signal Ground
2 TXD Serial Data from Radio to Computer
3 RXD Serial Data from Computer to Radio
4 CTS Computer Ready; (Radio Input)
5 RTS Radio Ready; (Radio Output)
6 No Connection

Pins 4 and 5 may be left Unconnected.

(MORE INFO ON THE TS440S IS AVAILABLE IN FILE NAMED TS440S.1 AND TS440S.2 - REQUEST THEM FROM THE SERVER)

Command Description for Kenwood Computer Interface

Auto Information
_____

AIn;

The Radio Will Send the Status Info Automatically
Whenever the Operator Manually Varies any Function on the Radio which is Covered in the IF; Command
Where n = 0 for Auto Info OFF

1 for Auto Info On

The Status Information Will be Sent in the Form :
As defined in the IF; Command

Display Memory
_____
DMnnnn;
This is a Factory Diagnostic Function and is of no practical use to the operator

The Contents of the MPU Memory will be Read
Where nnnn = MPU Address (0000 Thru FFFF (HEX))

The Contents of the MPU Memory Will be Sent in the Form :
As defined in the IF; Command

Display Memory

DMnnnn;

This is a Factory Diagnostic Function and is of no practical use to the operator

The Contents of the MPU Memory will be Read
Where nnnn = MPU Address (0000 Thru FFFF (HEX))

The Contents of the MPU Memory Will be Sent in the Form :
DMnnnn-aabbccddeeffgghhiijjkk;

Where nnnn = MPU Address (0000 Thru FFFF (HEX))
aakk = Hex Number Pairs Of Next 16 Locations

Down

DN;
The Frequency or Memory Channel
Will Decrement One Step

Frequency VFO A / VFO B Request

FA;
FB;
The Frequency in the Selected VFO Will be Read

The Frequency Will be Sent in the Form:
FAggmmmkkkhhh; or FBggmmmkkkhhh;
Where gg = GHz. Value
mmm = MHz. Value
kkk = kHz. Value
hhh = Hz. Value

Frequency VFO A / VFO B Select

FAggmmmkkkhhh;
FBggmmmkkkhhh;
The VFO Selected Will be Set to the Frequency Defined
Where gg = GHz. Value (May be sent As 00 or Spaces)
mmm = MHz. Value
kkk = kHz. Value
hhh = Hz. Value

Function Select

FNn;

The Function Defined Will be Selected
Where n = 0 for VFO A
1 for VFO B
2 for MEMORY

Identify Model Request

ID;
The Model of the Radio Will be sent in the Form :ID00n;
Where : n = 1 for a TS-940 (*)
n = 2 for a TS-811 (*)
n = 3 for a TS-711 (*)
n = 4 for a TS-440

Read Information Request

IF;
The Status Information Will be Sent in the Form : IFggmmmkkkhhh snnnzrx yytdfcp
Where gghhh = Value as defined in FA Command
s = '+' or '-' Value of RIT/XIT
nnn = Value of RIT/XIT (n.nn kHz.)
z = '0' (Not Used in TS-440)
r = Value as defined in RT Command
x = Value as defined in XT Command
yy = Memory Channel No.
t = 0 for Receive
1 for Transmit
d = Value as defined in MD Command
f = Value as defined in FN Command
c = Value as defined in SC Command
p = Value as defined in SP Command

Lock Knob

LKn;
The Manual Frequency Control Functions Will be Disabled
Where n = 0 for Lock OFF
1 for Lock ON

Memory Channel Select

MCxmm;
The Memory Channel Defined Will be Selected
Where: x = Don't Care (Use '0' or Space)
mm = Memory Channel No. (00 thru 99)

Mode Select

MDn;
The Mode Defined Will Be Selected

Where: n = 1 for LSB
2 for USB
3 for CW
4 for FM
5 for AM
6 for FSK

Memory Read

_____
MRnxrr;
The Memory Channel Defined Will be Read
Where: n = 0 for RX VFO
1 FOR TX VFO (Split Channels Only)
x = Don't Care (Use '0' or Space)
rr = Memory Channel No. (00 thru 99)

The Memory Information will be sent in the Form :
MRn rrggmmmkkkhhhdz ;
Where: n = 0 for RX VFO
1 FOR TX VFO (Split Channels Only)
rr = Memory Channel No. (00 thru 99)
gghhh = Value as defined in FA Command
d = Value as defined in MD Command
z = '0' (Not Used in TS-440)

RIT/XIT Clear

_____
RC;
The RIT/XIT will be set to 0.00 kHz.

RIT/XIT Down

_____
RD;
The RIT/XIT will Decrement by 0.01 KHz. (10 Hz.)

RIT/XIT UP

_____
RU;
The RIT/XIT will Increment by 0.01 KHz. (10 Hz.)

TS-440S (The whole scoop)

The TS440 is nice. Here's what I've found out about it that isn't in the operation manual (in some random order):

Diode options: There are a bunch of configuration options controlled by clipping or inserting diodes on the back of the control board. You get to it by taking the top and bottom covers off (a bunch of silver screws), loosening the front panel (4 flat-head silver screws, NOT the black ones). Then you have:

diode controls in out (cut)

D65	mode confirmation	Morse	single beep
D66	display resolution	100 Hz	10 Hz
D67	memory protect	none	on
D73	CW shift	800 Hz	400 Hz
D78	WARC 24MHx band tx	disabled	enabled
D79	WARC 18MHz band tx	disabled	enabled
D80	General Coverage tx	disabled	enabled

Self-Test: You can run a rather complete test of the control logic by the built-in "semi-self-test", a series of 56 routines. To run this,
turn the unit on whilst holding the AM and T-F SET switches pushed in. It changes to the next test when you turn the VFO knob clockwise. Turn the power OFF to reset the unit.

Test	What it does
0	all positions in display light
1	all segments in display dark
2	all positions in display light
3	all segments in display dark
4	one digit lighted (rightmost)
5	next digit lighted
6	next digit lighted
7	next digit lighted
8	next digit lighted
9	next digit lighted
10	next digit lighted
11	next digit lighted
12	next digit lighted
13	next digit lighted
14	next digit lighted
15	next digit lighted
16	next digit lighted (leftmost)
17	feeper sounds
18	feeper silent
19	all mode LEDs ON
20	all mode LEDs OFF
21	receive
22	transmit

The following tests change internal signals. They are most useful if you are trying to trace the circuits controlled by these signals.
You'll need a s service manual (or at least a schematic) to made reals sense of these.

23	Band select - all lines high
24	BAND select - all lines low
25	PD select - all lines high
26	PD select - all lines low
27	ENF select - all lines high
28	ENF select - all lines low

29 ENP select - a:ll lines high
30 ENP select - all lines low
31 RES select - all lines high
32 RES select - all lines low
33 CO select - all lines high
34 CO select - all lines low
35 AX select - all lines high
36 AX select - all lines low

these next tests check the outputs of the 8255 parallel port interfaces, which select several internal functions.

37 (IC2) port A all lines high
38 (IC2) port A all lines low
39 (IC2) port B all lines high
40 (IC2) port B all lines low
41 (IC2) port C0-C3 high, C4-C7 low
42 (IC2) port C0-C3 low, C4-C7 high
43 (IC53) port C all lines high
44 (IC53) port C all lines low

Following display busy lines and scan lines in the rightmost 9 digits of the display. You will push buttons to cause the digit to change from a 1 to a 0 indicating that the associated button has been pushed.

test bit8 bit7 bit6 bit5 bit4 bit3 bit2 bit1 bit0
---- ---- ---- ---- ---- ---- ---- ---- ---- ----
45 LOCK AT Mic UP Mic DN PTT/AT VS1
46 (none)
47 (key scanner)
48 1 6 V/M VOICE
49 2 7 M>V RIT A/B
50 3 8 SCAN XIT SPLIT
51 4 9 M.IN T-Fset A=B dip3 dip4 dip5
52 5 0 CLEAR 1Mhz dip1 dip2 dip6 dip7
53 ENT DOWN UP dip8 dip9 dip10

(the digits 0-9 are on the front panel keyboard; dip2-dip10 are the segments of S50, the SSB frequency response dipswitch on the rear of the control unit printed circuit board.)

54 not used
55 not used
56 END

Serial interface: The TS440 has a serial ASCII interface option. You have to insert two chips into sockets on the back of the control unit circuit board to take advantage of this. IC54 is an 8251A Uart, and IC55 is a CD4040 divider. These chips are available from Kenwood together with a interface manual, or you can buy them at your local chip shop for about $6.00 or so. When inserted, the transceiver speaks 4800 baud ascii in/out the 6-pin DIN connector ACC-1 on the rear. The signals are from the 8251, but are inverted in a 74LS04 and RFI filtered before being brought out to the world. An interface box with inverter, RFI filter, power supply, opto-isolator, RS232 level shifters, and power supply is available from Kenwood for about $49.00, or you can build your own.

(Depending on how much your computer radiates and how sensitive to RF it is, you may only need 5v, +/-12v, a 74LS14, MC1488, and MC1489. If your computer has a TTL level serial port, perhaps all you'll need is the 74LS14. If you're not confident of being able to solve the possible digital/RF interface problems yourself, the $49 interface is probably a good buy.)

ACC-1 Serial Interface
pin signal
--- ---
1 signal ground
2 data from transceiver
3 data to tranceiver
4 cts to transceiver - computer can throttle output
5 cts to computer - transceiver can throttle input
6 no connection

(I'm working on a program to control and monitor the transceiver over this port. I'll post it and a list of commands separately when I've got them all working.)

SSB frequency response dipswitch: located on the back of the control unit, this adjusts the frequency response of the upper and lower sideband modulators to compensate for component variations. Changing it isn't a good idea, since you have tpo have a two-tone oscillator and have to reset the carrier suppression adjustment if you do. The service manual explains this process; I'm including this here so that people who have been wondering what the dipswitch does won't screw themselves by flipping switches to see what happens.

A few adjustments you should know about (read the service manual before you tweak wildly on these!):

tweaker what it does
------- ---
RF-VR3 FM Microphone Gain
RF-VR6 FM Deviation - set to 4.6KHz on dev meter
IF-VR2 S-meter zero - set to zero with 50 ohm dummy load
IF-VR3 S-meter S9 - set to S9 with 40dbu input 14.175MHz USB
IF-VR4 Squelch threshold - close at 12 o'clock with mode = CW and filter WIDE
IF-VR9 CW side tone level - as you like it
IF-VR10 Beep tone level - as you like it

Someone wanted to know what the difference between the DATA connections on ACC-2 and the AFSK connectors was. On output, none; the AFSK and the DATA out pin on ACC-2 are connected together, and are fed from the high side of the volume control - they are receiver audio BEFORE the cw sidetone, feeper, and voice response unit are mixed in, and should be a constant level independent of the AF gain setting. The AFSK input is different from the DATA IN connection; AFSK and microphone signals both go through the mike preamp and speech processor; the DATA input bypasses both. The MIC GAIN pot does control all three input levels.
(as a note, you can tap preamped/processed audio OUT of the DATA IN connection, since it is just a tap on the output of the preamp/processor. This is also the feed into the FM modulator. But NOTE that

the MIC GAIN pot doesn't adjust the mic gain on FM - there is a separate tweaker for that.)

TS 440 BCB Improvement. Attenuater removal

1> Remoev top and bottom covers.

2> The bottom of the radio is where the R.F Unit is located. In the center of the pc board is a shield covering the band pass filters. Remove 3 screws from the shiled and fold if out of the way (There is a ground wire attached to the shield).

3> At the end of the filter section, closest to the center of the PC board is the broacast attenuator. It consists of R12, R13,R14 using small cutters. Cut the exposed lead on R13, R14 Take à lead from a small resistor, or a piece of solid hookup wire and jumper R12.

4> Repalce the filter cover and the radio covers.

This completes the modification, no ajustement are necessary.
It and it appears to work as Advertised No well see if any HF interference shows UP DOWN the board.

TS-440 S Modification to use antenna tunner fot XT and RX.

Remove case from rig. Remove (4) screws that holds antenna tuner in place. Next slide antenna tuner out to get to the coax connections. Remove the in coax attached to antenna tunerfrom FO connector on filter unit (X51-1340-00). Remove coax from out connector on antenna tuner and install in FO CONNECTOR ON FILTER UNIT. Unplug and remove switch unit (X41-1610-00 N-14) from rig.
Remove short wire from antenna connector to PC BOARD. Cut coax on the in connector of antenna tuner in half and connect cut end to switch unit PC BOARD
Where short antenna wire was removed and shield to ground. Solder other half of coax to antenna connector and shield to ground, and plug other end into out conector of antenna tuner. Your still have control of antenna tuner with auto and thru switch. It works very well. Maybe someone can use this idea.

TS-440S Digital Audio Modification

NOTICE:
Please be very careful with your transcievers, and we accept no responsiablity for any damage that may be incurred, and this
modification may, and proably would be cause for any WARENTY to be DISCONTINUED.

This Modification allows for the Kenwood TS-440s transceiver to have the data audio on PIN 11 of the 13 pin DIN connector ACC JACK 2. Later models may or maynot have a correction for this, but my PK-232, or for that fact NONE of my TNC's would drive the audio to the PIN 11 of ACC JACK 2. Encountering this problem, and having another H.F. transceiver I have been using the REMOTE connector, and using an audio input to the AFSK IN RCA type connector. This would allow me to use the same cable with my TS-180s also. Anyway this modification moves the wire's from the AFSK IN to the ACC 2 connector. This should only take about 20 to 30 minutes to preform this change, and most of the time is used up with the removal, and replacement of the THREE covers of the transceivers cabinet.
The circuit boards to work with, are called:
DISPLAY UNIT (X54-1870-00) (C/4) This has the ACC 2 JACK.
SWITCH UNIT (X41-1610-00) (M/14) This has the AFSK INPUT.

The eaiest way is to remove these two boards 4 screws hold the ACC 2 JACK, and 2 screws hold the AFSK INPUT board in and they are located at the rear of the transceiver. If you are interested in following the SCEHMATIC in your manual, the leads you will be working with are ANI, and GROUND which is the PURPLE LEADS, and the FSI lead and GROUND, which are the GREEN leads.

The problem is that when kenwood designed this rig, they brought the DATA INPUT(ANI) from the ACC2 JACK to connector J25 of the IF UNIT. This coming in after the Processor, and Microphone Amplifier does not allow sufficent amplification of the signal, thus very low, or no audio at all. What this modification does is swap at the rear of the RIG the FSI, and ANI signals, Which also could be done on the IF UNIT board, and for some may actually be eaiser. In my case the leads were just a bit too short to allow this modification to be accomplished on the IF UNIT.

MODIFICATION

Step 1. Be shure to have on a work bench, and NO POWER APPLIED!
Step 2. Remove the TWO BOTTOM covers, One MAIN cover, and the smaller cover to the REAR of the transceiver.
Step 3. Remove the TOP cover.
Step 4. Remove the FOUR screws holding the AUTOMATIC ANTENNA TUNER.
Step 5. Place the transceiver on it's side with the BOTTOM towards you, and the FRONT to your LEFT.
Step 6. Being very careful, remove the antenna tuner and allow it to hang.
Step 7. Remove the TWO SCREWS that HOLD the AFSK INPUT board.
Step 8. Remove the FOUR SCREWS that HOLD the ACC 2 JACK board.
Step 9. Carefully from the inside of the transceiver, pull these TWO boards out.
Step 10. Near the Bottom edge of the ACC 2 JACK board, is a TWO lead connettor, unplug this. The leads should be URPLE.
Step 11.On the AFSK INPUT board, there is a 6 PIN connector, unplug this. The leads you will be working with are GREEN in color.
Step 12. Note how the PURPLE leads are connected to the connector itself, and remove these two leads by inserting a very small screwdriver into the slot on side, and being very gental, push the leads out one at a time.
Step 13.Now remove the GREEN leads the same manor.

Step 14.Insert the GREEN leads into the 2 PIN connector, the BLACK lead is the GROUND, and the WHITE or perhaps YELLOW is the AUDIO lead.
Step 15.Insert the PURPLE leads into the 6 PIN connector, noting that the smaller lead is the AUDIO lead, and it connects to PIN 2, the other lead, being BLACK goes into PIN 1.
Step 16.Now reassemble in reverse order the BOARDS, and start at STEP 11, and work in reverse to STEP 1.

Display Modification

I finally took the time to inspect carefully the problem on the TS-440S display problem. The first thing was to check the EPROM socket on the display board. I found that the socket was not in good shape.
The IC was very loose and the socket is of very poor quality. I removed the socket from the board with a solder sucker, making sure that none of the wires connected to the display board was damaged or pulled out.

You have to remove the 4 screws that hold the board to the front panel, so that the board is free and can swing open so you can have access to the other side. After this is accomplished, the rest is easy. Even though Kenwood says to remove the socket and solder the eprom right to the board. I chose not to solder the chip to the board. I decided to replace the socket with one bought
at Radio Shack for 0.89 cents. This particular socket has the connections right on the surface, so that when you place the Eprom on it, you can see that good contact is being made on each leg of the chip. The socket is called a low profile socket.

I soldered the socket to the board and replaced the eprom. I carefully placed all the wires were they belonged and replaced the metal cover over the display board. When everything was back in place I turned the rig on holding down the (A=B) indicator and did a reset. The freq display showed 14.000 mhz. The display is working fine so far, and all seems to be back to normal. I would not try this operation unless you have the right tools to desolder the socket, and a worktable with proper lighting. There are lots of wires to worry about. Be careful.. It beats sending it back to Kenwood. Kd2ej ..... Winston .....

TS-440 Fan Temperature Mod

I don't know about you, but I don't think solid state equipment needs to run hot enough to fry an egg on. The fan on the 440 is set to come on at 50 deg C. That makes the heatsink hot enough that you can only put your hand on it for about 3 seconds without being in pain.

Looking at the schematic and pondering the situation, I decided that it would be quite easy to change the "trigger" point for fan operation. This mod will do just that and not effect the "high-temp-shutdown" mode that is provided in case the fan dies. Actually, it wouldn't be a bad idea to make the same sort of mod to that circuit too, but let's just do this one for now. I'll put out another bulletin on this if I go into the failsafe circuit.

The fan is controlled by two sensing circuits on the FINAL UNIT. On the schematic, Q9(1/2) is the failsafe trigger that activates the powerdown circuit in case the final reaches 80 deg C. It won't normally do this, even under continuous keydown conditions, unless the fan has failed.Q9(2/2) is the stage that controls operation of the fan. It is a simple voltage comparator and therefore can be made to trigger wherever you want. TH1 is a thermistor with a negative coefficient. That is, when the temp rises, the resistance goes down. This pulls the - input to Q9(2/2) lower and lower until it is at or below the 2.26v reference that is present on the + input of the same stage. At that point, the output flips high and turns on Q8, thus turning on the fan. By raising the reference voltage at the + input, the TH1 voltage will fall to the reference voltage sooner and turn on the fan at a cooler temperature. By clipping the top loop of
R27 on the final unit (2.2k res. that provides reference voltage) and temporarily inserting a 5k precision multi-turn pot in series with it, I determined that I liked the way it operated with about 800 ohms extra resistance in the circuit.

I then installed an 820 ohm fixed resistor in series with the cut loop. I also put a very small dab of silicon seal between the new "hung" resistor and the ferrite transformer right next to it so that there would be no added strain on the remains of R27. The alternative would be to remove the final unit completely and do the mod the right way, replacing the complete R27 with a 3k resistor. This was a step that I didn't really want to perform on a two week old rig. When you choose your series resistance, remember that the more resistance you add to it, the sooner the fan will turn on. If you go too high, it will be on all the time.

This modification brings the fan on at least 10 deg. earlier. By the way, my only reservation about this mod is the added wear and tear on the fan unit itself. I have been buying parts from Kenwood for about 10 years now and they have always seemed remarkably inexpensive. Ordering a spare fan to have on hand seems like a very reasonable thing to do if you are worried about it.

TS-440S MARS MOD

To modify your TS-440S for MARS/CAP, follow the instructions listed in the operators manual for enabling the 10 HZ resolution, and clip DIODE 80 while you are in the same area. It is located upper left from where you found DIODE 66 at the end of the PC board (it will xmit where ever you can receive). These diodes are mounted 90 degrees from the board and are easy to spot.

Reset the radio when you turn it on and that is all. To reset turn power on while holding in the A-B switch.

CAUTION: Reseting will wipe out all 100 memory frequencies so you will have to reload them.

NOTE: Transmitting non-distress calls outside ham frequencies could result in stiff fines, possible imprisonment and loss of your amateur license!

This article also tells how to increase the power of the TS-440 by adjusting the internal ALC control. The procedure is applicable to

other rigs.

Illustration captions:

1. Remove 17 screws holding on the bottom and top covers. The bottom cover comes off, and the top cover is carefully removed and put next to the radio. It is till connected via the speaker wire.

2. Gain access to the front of the unit by removing two top side screws and loosening two bottom side screws. This allows the front assembly to swing open.

3. Remove the shiny silver control board protection plate. This requires removing two screws on the top and three screws on the bottom. Lift the plate out completely.

4. Locate diode D-80 in the bottom left-hand corner. Snip it for all-band transmit.

5. Now locate D-66 and snip. It adds 10 Hertz readout to your digital frequency display.

6. Carefully reassemble the control plate using a magnetized tiny screwdriver to hold the five tiny screws in place. Don't pinch any wires. Also, close up the front and replace the top and bottom covers with 17 screws.

7. Connect power. Depress A=B switch and turn on the power simultaneously. This resets the microprocessor for all-band transmit and 10 Hz frequency display.

TS-440s update

If you have been having some signal loss on either receive or transmit, you might check the J-15 connector on the IF board(X60-1300-00). I am not quite sure just what this circuit is doing (feedback or signal), but have been having some troubles with loss of full signal output, and a noticable 20+db signal loss on receive. Generally a quick slapp of the case restored the unit to normal (I thought) use, but within a few day's it was back to having trouble. Well it only took me 3 months to decide to find the culprit(s), and decided it had to be either a bad connection, or RING-OUT. After taking the case apart as was actually going to replace a bulb, I noticed that the signal strength was going up and down as I worked on the rig (never work on a rig with power on, unless doing alignments, or testing, never to replace a bulb! hihi) Anyway I got to moving some cables around and noticed that under certain circumstances that the signal would go from very weak to very strong.

This was also true in the transmit mode, where it would be full output to hardly any output, and could be anything in between. Oh well, the remedy was to correct the connection, by cleaning it, and making sure that the connectors have sufficent force to maintain good contact. J-15 is located next to the front corner by the Antenna Tuner.

NOTE: This proably was acentuated by being near the coast, and also using this rig for mobil uses. Just a quick hint for those having a simular problem, and a place to start.

NOTE: After this fix, The rig is actually preforming better than it ever has? No idea as to why it has been this way, but I did purchase the rig used a few years back.(6 months old at most).

Possible cure for TS440 showing dots only on display:

The most common reason for the the display to show only dots, is that one of the phase locked loops is not locked. So take of the top cover. You will be looking at the IF unit. This board is mounted in a hinged frame. It hinges on two screws near the front pannel sides. So remove the other two screws near the final unit instead and hinge the IF board towards you. You now uncovered the PLL unit.

There are five PLL's on this board. Each one has a pin indicating if its loop is locked or not. So get out a volt meter and set it for 5 volts full scale. Now check pin 2 for each of the following IC's. IC18, IC1, IC4, IC9.
Also check pin 7 of IC17. If all the loops are locked, you would see a steady voltage there in the neighbourhood of 4.7 volts. If any of the loops is not locked, one of these pins has a voltage well below 1 volt.
Note the IC number so you can look up which VCO you may have to tune a bit so it will lock again.

IC18 VCO#5 T20
IC1 VCO#4 T1
IC4 VCO#3 T2
IC9 VCO#2 T9
The above are all located on the PLL board.

The VCO for IC17 is actualy one out of four different VCO's selected on the RF board. Which one of these depends on what band is selected. If you have display dots on all the bands, then you have no problem with the PLL made up with IC17. So you only have to adjust either T1, T2, T9 or T20.

Now here it goes. Make sure you have an alignment tool that isn't to small or to large for the slots in the slugs in the coils (T1, T2, etc).
Also, absolutely don't turn any other coil than the one that belongs to the unlocked PLL. If you do so anyway without a service manual and proper equipment, then you are likely stupid.

Only turn the indicated slug. First turn it 1/4 clock wise and see if it is ok now. If not, turn it 1/4 counter clockwise and see if it works. I suggest that you don't try more than one half turn either way. If you think that it needs to go that far, it likely has an other problem.

If the display dot problem only shows up on some but not all band, send me a note and I will see if I can help you.

The correct way would be to use a good voltmeter and follow the service manual for this adjustment. But in most cases, the above will do fine.I don't work for

Kwood, I don't have a 440. Just a service manual for one. But I did cure some of the above problems.

TS-440 RX Audio Mods

Here's some easy modifications to improve the rx audio fidelity of Kenwood TS-440's.

All references below are to the IF board
component designations.
* Increase C60 to a .47uf or 1 uf. This will increase low frequency response on all modes.
* Decrease C51 to .01 uf. This will increase high frequency response on SSB/CW.
* Try removing R263 (tacked on the bottom of the board on my early production unit). This will lower in amplitude the audio coming out of the detectors and improved the smoothness (a real technical term) of the audio, especially on AM signals.
And, of course, I take no responsibilty for anything you do to your radio.
Be careful.
The IF board on the 440' is about the easiestone to get at.

TS-440S Protection

If pin 7 (RL) of the remote connector is accidently connected to ground, current from the 14 volt line (14L) will damage transistor Q33 on the IF unit. This will prevent the radio from transmitting. To protect Q33, a 4.7 ohm resistor should be installed in series with the RL line on the foil side of the IF board. In the event that pin 7 is connected to ground, the resistor will open, but the
transceiver will still be capable of transmitting.
REQUIRED PART:

4.7 OHM, 1/6 WATT RESISTOR RD14CB2C4R7J

1 Disconnect the power supply and antenna from the transceiver.
2 Using a #2 Phillips screw driver, remove the 9 screws from the top cover of the transceiver. Remove the cover and unplug the speaker wire.
3 Locate connector 19 on the IF unit.
4 Using a #1 Phillips screw driver, remove the 7 screws that secure the IF unit to the chassis of the transceiver.
5 Pull the board up and rotate it towards the front of the transceiver to expose the foil side of the board.
6 On the foil side of the board, locate the trace that is connected to pin 3 (brown wire) of connector 19.
7 Using a craft knife, cut the trace comming from pin three so as to open the foil trace.
8 Solder the 4.7 ohm resistor across the now open trace (i.e. in series with the trace).
9 Assemble the transceiver by reversing steps 1 - 5

Kenwood TS440 Modifications

1. Remove 17 screws holding on the bottom and top covers. The bottom cover comes off, and the top cover is carefully removed and put next to the radio. It is till connected via the speaker wire.
2. Gain access to the front of the unit by removing two top side screws and loosening two bottom side screws. This allows the front assembly to swing open.
3. Remove the shiny silver control board protection plate. This requires removing two screws on the top and three screws on the bottom. Lift the plate out completely.
4. Locate diode D-80 in the bottom left-hand corner. Snip it for all-band transmit.
5. Now locate D-66 and snip. It adds 10 Hertz readout to your digital frequency display.
6. Carefully reassemble the control plate using a magnetized tiny screwdriver to hold the five tiny screws in place. Don't pinch any wires. Also, close up the front and replace the top and bottom covers with 17 screws.
7. Connect power. Depress A=B switch and turn on the power simultaneously. This resets the microprocessor for all-band transmit and 10 Hz frequency display.

This article also tells how to increase the power of the TS-440 by adjusting the internal ALC control. The procedure is applicable to other rig.

TS440S Ant. Connector

If you have a Kenwood TS-440S with a threaded antenna connector held in place by a nut, you'll probably have problems with the connector becoming loose, and when that happens and you attempt to remove the coax from the conector, the connector will rotate, and the small cable that is connected internally will either become loose or break off. The result of that will be low or no output. It is also possible that the output will be intermittent.

The solution to this problem is not simply tightening the nut that holds the connector to the chassi. The solution is to remove that connector, and replace

it with a standard PL-239 with a square base with 4 screw holes. In order to mount this to the 440S, you will have to file the hole on the rig slightly. Don't be afraid the chassi material is soft and easy to file with a small round file. Once this is done you can them position the PL-239 and drill 2 small holes in order to attach the connector to the chassi with 2 screws. There is no need to use all 4 screws.

Simply solder the small wire that comes from the board right by the antenna connector to the PL-239 and you're finished. I actually removed the small circuit board right under the antenna connector and replaced the very thin wire that is soldered to the antenna connector. I used the inner conductor of a piece of RG-8 solid center coax, and then soldered this new wire to the PL-239 connector. You

will never have a problem again with the antenna connect or becoming loose.

TS-440S Display Calibration

I found there was some shift in the reference oscillator frequency of my TS-440S. This can be noticed and corrected as follows:
1. Remove the top and bottom covers from the radio.
2. Do not disconnect the speaker cable.
3. Connect the supplied calibration cable between RF Unit and PLL unit, as shown in "Kenwood TS-440S Instruction Manual" on Page 24 in Section 5-8-3.
4. Set VFO A to 10.001.00 MHz LSB and VFO B to 9.999.00 MHz USB.
5. Pushing the A/B function button, you can have different
audio signals, if that 36 MHz reference oscillator is misadjusted.
6. Using a small flat bladed scredriver, adjust trimmer capacitor TC1, near connector 8 of the PLL Unit (the
location shown in Instruction Manual in the same section as above) until those audio frequencies from VFO's A and B are equal.
7. Disconnect the calibration cable and reassemble the radio. This procedure can be done by ear with good
accuracy without any measuring equipment. WWV is too weak here in Finland to use it as comparative signal for the procedured described in "Instruction Manual", Section 5-8-3.